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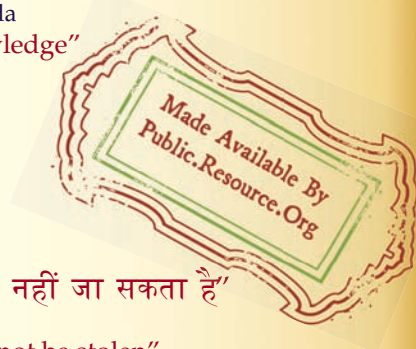
IS 8859 (1978): Cast copper tuyere [MTD 8: Copper and Copper Alloys]



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“Knowledge is such a treasure which cannot be stolen”

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IS : 8859 - 1978

(Reaffirmed 2006)

Indian Standard
**SPECIFICATION FOR
CAST COPPER TUYERE**

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SPECIFICATION FOR CAST COPPER TUYERE

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Indian Standard

SPECIFICATION FOR CAST COPPER TUYERE

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 3 August 1978, after the draft finalized by the Copper and Copper Alloys Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 Copper is used for casting of tuyeres and other copper components used in the blast-furnaces mainly because of its unique quality of high thermal conductivity, pressure tightness and castability. While selecting the material for cast tuyere, practical metallurgical problems as obtainable under Indian conditions have to be taken into account.

0.2.1 Tuyere is made of high-purity de-oxidized copper, as tuyere made from low-purity copper may not be competent for this purpose and may fail within weeks or even days. It is also important that tuyere should be adequately tested for pressure tightness. Keeping this in view, need was felt for a standard which should lay down minimum requirements of chemical composition, mechanical properties, electrical conductivity of the material and also specify test for pressure tightness to which cast copper tuyere should be subjected to before it is accepted as a suitable material for use in blast-furnaces. However, some requirements, such as degree of finish may be agreed to between the supplier and the purchaser.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS: 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard covers the requirements for cast copper tuyere used in blast-furnace in the iron and steel plants.

*Rules for rounding off numerical values (*revised*).

2. SUPPLY OF MATERIAL

2.1 General requirements relating to supply of material shall conform to IS : 1387-1967*.

3. TERMINOLOGY

3.0 For the purpose of this standard, the following definitions shall apply.

3.1 **Cast** — A cast is to be taken as either:

- a) the product of one furnace melt,
- b) the product of one crucible melt, and
- c) the product of a number of furnace or crucible melts where such are aggregated and mixed prior to sampling.

3.2 **Cast Copper Tuyere** — Water jacket device cast from copper to the desired shape and size for introducing air blast in blast-furnace.

4. FREEDOM FROM DEFECTS

4.1 The cast tuyere shall be free from sand, slag inclusions, cracks, porosity, blow-holes and other harmful defects.

5. CHEMICAL COMPOSITION

5.1 The chemical composition of the tuyere, when analyzed in accordance with IS : 440-1964† shall be as follows:

<i>Constituent</i>	<i>Percent</i>
Copper, <i>Min</i>	99.5
Phosphorus, <i>Max</i>	0.02
Arsenic, <i>Max</i>	0.02
Nickel + Zinc + Tin, <i>Max</i>	0.4
Other impurities, <i>Max</i>	0.05

NOTE — If mutually agreed, tin may be added up to 1.5 percent *Max*. A coupon test piece measuring 25 × 25 × 6 mm thick may be cast separately for chemical analysis.

6. MECHANICAL TESTS

6.1 The material when tested in accordance with IS : 2654-1964‡ shall have the following mechanical properties:

Tensile strength, <i>Min</i>	150 N/mm ² (15 kgf/mm ²)
Elongation percent on gauge length of 5.65√ <i>S₀</i> , <i>Min</i>	25

*General requirements for the supply of metallurgical materials (*first revision*).

†Methods of chemical analysis of copper (*revised*).

‡Method for tensile testing of copper and copper alloys.

7. ELECTRICAL CONDUCTIVITY/RESISTIVITY

7.1 Resistivity/conductivity when referred to in this standard is volume resistivity/conductivity. The conductivity, as measured from the same cast as in IS : 8130-1976* shall be minimum 80 percent IACS. The International Annealed Copper Standard values for the resistivity of annealed copper when measured at 20°C is equal to 1.724 1 microhm or 100 percent IACS conductivity.

8. DIMENSIONAL TOLERANCES

8.1 Normal open general dimensions as given in IS : 2102-1969† shall apply.

9. PRESSURE TESTING

9.1 Unless otherwise specified, the tuyeres shall withstand hydraulic pressure of 10 kg/cm² for 10 minutes without any leakage and sweating. From time to time, the tuyeres shall be gently hit with a wooden mallet, while under pressure, and again checked for any leakage or sweating.

10. REPAIR OF TUYERES

10.1 Any repair or coating of the surface of tuyeres, which may conceal the defects such as porosity, pin holes is not permitted. Any repair has to be agreed between the supplier and the purchaser.

11. MARKING

11.1 Each tuyere shall have the manufacturer's identification stamps. These shall be at least in 20 mm size. Mark, such as size and identification details should be cast in the front flat face of the tuyere.

11.1.1 Tuyere may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

*Specification for conductors for insulated electric cables and flexible cords.

†Allowable deviations for dimensions without specified tolerances (*first revision*).

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	CONVERSION
Force	newton	N	1 N = 0.101 972 kgf
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²